

REMARKS

Claims 1, 3-5, 7, 8, 10, 13-15, and 20 have been amended. Support for the amendments to the claims may be found throughout the specification. No new matter has been added. Upon entry of this Amendment, claims 1-20 remain pending.

In the Office Action dated July 21, 2006, claims 1-6, 8-16, and 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Somekh (U.S. Patent No. 6,427,703) in view of Ohtoshi et al. (U.S. Patent No. 5,539,211). Applicants respectfully traverse this rejection.

Independent claim 1 recites a lithographic projection apparatus that includes, *inter alia*, “a downstream radical source having a tube connected to a gas supply and configured to provide a beam of radicals directed onto a surface of a component to be cleaned, wherein the radicals are generated within a flow of gas from the gas supply in the tube, and wherein the tube of the radical source is constructed and arranged to be moved relative to the surface to be cleaned and/or the component is constructed and arranged to be moved relative to the tube of the radical source so that the beam of radicals is incident on the surface to be cleaned.” The combination of Somekh and Ohtoshi et al. does not disclose or suggest all of the features of claim 1.

Somekh discloses a lithography system (200) that includes an oxidizer source (216) that introduces an oxidizer into an illumination chamber (204) and a process chamber (220). *See* Somekh at col. 6, lns. 19-22. Somekh discloses that the oxidizer is provided by the oxidizer source (216) in an activated state. *See* Somekh at col. 6, lns. 37-38. The oxidizer is introduced to the illumination chamber (204) through a nozzle (224) that is inserted through a wall of the illumination chamber (204), and the oxidizer is also introduced to the process chamber (220) through a nozzle (215) that is inserted through a wall of the process chamber (220). *See* Somekh at col. 7, lns. 11-16; FIG. 2A. The nozzles (215, 224) may be aimed or configured to direct oxidizer over surfaces in the process and illumination chambers (220, 204), respectively. *See* Somekh at col. 7, lns. 19-23. After such configuration, there is no relative movement of the beam of radicals or the surface to be cleaned, as there is no teaching by Somekh that the piping between the oxidizer source (216) and the nozzles (215, 224) is configured to be moved relative to the surface to be cleaned, or that the surface to be cleaned is configured to be moved relative to the piping so that a beam of radicals is incident on the surface to be cleaned.

Ohtoshi et al. discloses an electron beam exposure apparatus that includes a column (1), a plasma generating portion (2) and a source tank (3) that supplies a plasma source gas

(e.g. a mixture of O<sub>2</sub> gas and a CF<sub>4</sub> gas) through piping. *See* Ohtoshi et al. at col. 11, ln. 50 – col. 12, ln. 9; FIG. 2. Ohtoshi et al. does not teach that the plasma generating portion, the piping, or any component within the apparatus is configured to be moved relative to each other so that a beam of radicals is incident on the surface to be cleaned.

Accordingly, Applicants respectfully submit that claim 1 and the claims that depend from claim 1 are patentable over Somekh in view of Ohtoshi et al., and respectfully request that the rejection to claims 1-6, and 8-13 be withdrawn.

Independent claim 14 recites a device manufacturing method that includes, *inter alia*, “generating a beam of radicals in the flow of gas from the gas supply in a tube of a downstream radical source; moving the tube of the radical source relative to a component comprising a surface to be cleaned and/or moving the component relative to the tube of the radical source; and directing said beam of radicals onto the surface to be cleaned so that the beam of radicals is incident on the surface to be cleaned.” The combination of Somekh and Ohtoshi et al. does not disclose or suggest all of the features of claim 14.

Somekh and Ohtoshi et al. are discussed above. As discussed above, neither Somekh nor Ohtoshi et al. teaches that the piping that provides radicals may be moved relative to the component having the surface to be cleaned or that a component having a surface to be cleaned may be moved relative to the piping so that the beam of radicals is incident on the surface to be cleaned.

Accordingly, Applicants respectfully submit that claim 14 is patentable over Somekh in view of Ohtoshi et al. and respectfully request that the rejection to claim 14 be withdrawn.

Independent claim 15 recites a lithographic projection apparatus that includes, *inter alia*, “a radical source connected to a gas supply and configured to generate a localized beam of radicals in a flow of gas from the gas supply in a tube of the radical source; and a structure to direct said beam of radicals onto a surface to be cleaned, wherein said radical source is disposed away from said radiation source such that operating conditions of said radical source do not adversely affect said beam of radiation, and wherein the tube of the radical source is constructed and arranged to be moved relative to a component comprising the surface to be cleaned and/or the component is constructed and arranged to be moved relative to the tube of the radical source so that the localized beam of radicals is incident on the surface to be cleaned.” The combination of Somekh and Ohtoshi et al. does not disclose or suggest all of the features of claim 15.

Somekh and Ohtoshi et al. are discussed above. As discussed above, neither Somekh nor Ohtoshi et al. teaches that the piping that provides radicals may be moved relative to a component having a surface to be cleaned or that a component having a surface to be cleaned may be moved relative to the piping so that the beam of radicals is incident on the surface to be cleaned.

Accordingly, Applicants respectfully submit that claim 15 and the claims that depend from claim 15 are patentable over Somekh in view of Ohtoshi et al., and respectfully request that the rejection to claims 15, 16, and 20 be withdrawn.

In the Office Action, claim 7 was rejected as being unpatentable over Somekh in view of Ohtoshi et al., and further in view of Horiike et al. (U.S. Patent No. 5,308,791). Applicants respectfully traverse this rejection.

Claim 7 depends from claim 1. As discussed above, claim 1 is patentable over Somekh in view of Ohtoshi et al. Horiike et al. does not cure the deficiencies of Somekh and Ohtoshi et al. Horiike et al. discloses an apparatus for processing the surface of an Si wafer. *See* Horiike et al. at Abstract. The apparatus includes a cleaning chamber (3) for cleaning the wafer (1). *See* Horiike et al. at col. 4, lns. 15-28. The wafer (1) is cleaned in the cleaning chamber (3) prior to being moved into the process chamber (8) for processing. *See* Horiike et al. at col. 5, lns. 27-48. A plasma generating section (4) has a plasma generating area (12) that is communicated to an inlet (11) of the cleaning chamber (3). *See* Horiike et al. at col. 4, lns. 51-54. Horiike et al. does not teach that the plasma generating section is configured to be moved relative to the wafer or that the wafer may be moved relative to the plasma generating section so that a beam of radicals are incident on the surface of the wafer.

Accordingly, Applicants respectfully submit that claim 7 is patentable over Somekh in view of Ohtoshi et al. in view of Horiike et al., and respectfully request that the rejection to claim 7 be withdrawn.

In the Office Action, claim 17 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Somekh in view of Ohtoshi et al. and further in view of Sakai et al. (U.S. Patent No. 5,312,519). Applicants respectfully traverse this rejection.

Claim 17 depends from claim 16, which depends from claim 15. As discussed above, claim 15 is patentable over Somekh in view of Ohtoshi et al. Sakai et al. does not cure the deficiencies of Somekh and Ohtoshi et al.

Sakai et al. discloses a discharge tube (18) that selectively supplies active species of F\*(radical) and O\*(radical) to a chamber (3) through an active species introduction port (19).

*See Sakai et al.* at col. 3, lns. 49-58. The active species are generally supplied to the chamber (3) and are not formed into a localized beam. *See Sakai et al.* at col. 3, ln. 62 – col. 4, ln. 39. Sakai et al. discloses that the introduction port (19) should be positioned near the portion of the apparatus that has the most serious problem of contamination, *see Sakai et al.* at col. 7, lns. 61-65, but does not disclose that the discharge tube may be moved relative to a component having a surface to be cleaned or that a component having a surface to be cleaned may be moved relative to the discharge tube so that a beam of radicals is incident on the surface to be cleaned.

Accordingly, Applicants respectfully submit that claim 17 is patentable over Somekh in view of Ohtoshi et al. in view of Sakai et al. and respectfully request that the rejection be withdrawn.

In the Office Action, claims 18 and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Somekh in view of Ohtoshi et al., and further in view of Vane (U.S. Patent No. 6,105,589). Applicants respectfully traverse this rejection.

Claim 18 depends from claim 16, which depends from independent claim 15. Claim 19 depends from claim 18. As discussed above, claim 15 is patentable over Somekh in view of Ohtoshi et al. Vane does not cure the deficiencies of Somekh and Ohtoshi et al.

Vane discloses a method and apparatus for cleaning electron microscopes. *See Vane* at Abstract. Vane discloses that a plasma chamber (50) is provided to project a plasma into the full specimen chamber (4). *See Vane* at col. 7, ln. 54 – col. 8, ln. 3; FIG. 1. The plasma chamber (50) is separate from the gas supply (42) and gas from the gas supply (42) is fed into the chamber (4) and into the plasma. *See Vane* at col. 8, lns. 17-26; FIG. 1. Oxygen radicals from the plasma are carried into the chamber by convection. *See Vane* at col. 8, lns. 24-25. Vane does not disclose or suggest that the plasma generates a localized beam of radicals or that the plasma chamber may be moved relative to a component having a surface to be cleaned or that a component having a surface to be cleaned may be moved relative to the plasma chamber so that a beam of radicals is incident on the surface to be cleaned.

Moreover, Vane specifically states that the conductive screen (53) described at col. 7, lns. 62-66 is not a trap for the charged species of the plasma, but instead confines the electric fields and defines and fixes the impedance between the glow electrode (51) and the plasma chamber (50) walls. *See Vane* at col. 7, lns. 62-66. Vane simply does not disclose or suggest that a Faraday grid neutralizes the ionized particles, as recited by claim 18. Accordingly, Applicants respectfully submit that claims 18 and 19 are patentable over Somekh in view of

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Ohtoshi et al. in view of Vane and respectfully request that the rejection to claims 18 and 19 be withdrawn.

All rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975: The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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